Reg No: ELGA12/20232

Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Introduction to Electrical Engineering

Course Code:	ELGA12
Course Title:	Introduction to Electrical Engineering *Introduktion till elektroteknik*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has only upper-secondary level entry requirements (G1N)

Major Field of Study:
ETA (Electrical Engineering)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2023-02-02, and is valid from the Autumn semester 2023 at Karlstad University.

Prerequisites
General admission requirements and upper secondary level Mathematics 3c/Mathematics D, Physics 2, and Chemistry 1, or equivalent

Learning Outcomes
The aim of the course is for students to be introduced to the subject of electrical engineering, get a basic idea of their future course of study and their future professional role as engineers, and acquire knowledge of important tools that they will use as part of their education.

Upon completion of the course, students should be able to:

The basics of electrical engineering
- give an account of some selected electrical engineering systems and the models of these,

- describe electric and magnetic fields and discuss their applications,
- plan and participate actively in a group project focused on electrical engineering, according to instructions,
- present projects in oral and written reports, in accordance with conventions regarding structure and language,
- give an account of common electrical measuring instruments, measuring methods, and measuring principles,
- use electrical components in simple connections,
- use universal instrument, signal generator, and oscilloscope,
- use Newton's laws of motion and explain the principles of kinematics at a general level, and
- define energy and the energy principle.

The professional role
- give an account of and reflect upon the concepts of sustainable development and professional ethics from the perspective of an engineer.

Study techniques
- give an account of and apply received knowledge of group dynamics and project methodology.

Content
Instruction is in the form of lectures, supervised exercises and seminars, laboratory sessions and a project.

The basics of electrical engineering
a) Electricity: Coulomb's law, special cases of Gauss's law, potential and capacitance, energy in capacitors, current and resistance, direct current circuits.
b) Magnetism: Definition of magnetic fields, magnetic forces on an electric conductor, torque on a current loop, special cases of Biot-Savart's law, Ampère's law, and Gauss's law.
c) Electromagnetism: Special cases of Faraday's law, self inductance, mutual inductance, energy in inductors, oscillation in a circuit with condensators and inductors.

- a group project on electrical engineering, presented orally and in writing
- measuring principles and measuring methods with electrical instruments
- processing of measurement data
- introduction to different subject areas included in the concept of electrical engineering
- introduction to mechanics from the perspective of electrical engineering, for instance motion in one and two dimensions, laws of motion, and energy and the energy principle

The professional role
- sustainable development and ethics in relation to the professional role of the engineer
- the basics of common digital tools for word processing, calculation and data processing, and presentations
- laboratory work and lab reports
- presentation techniques and report writing
- workplace visits and meetings with working engineers

Study techniques
- introduction to study techniques for the academic level
- the basics of group dynamics and project methodology
- overview of systems for administration and collaboration

Reading List
See separate document.

Examination
Assessment is based on a written exam, written and oral presentations, and reports. Laboratory sessions, seminars, study visits, and projects are mandatory.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades
One of the grades Pass with Distinction (5), Pass with Some Distinction (4), Pass (3) or Fail is awarded in the examination of the course.

Quality Assurance
Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate
A course certificate will be provided upon request.

Additional information
The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.